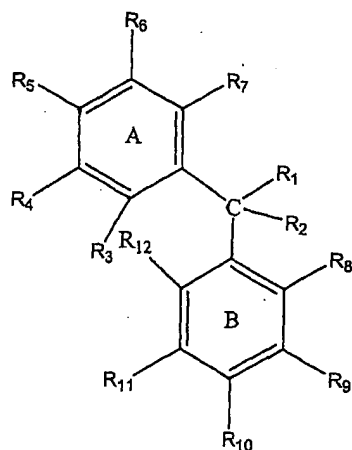


## CLAIMS

## 1. Use of a compound having the formula I



Formula I

5

wherein A and B are rings linked together by a bridge C and independently represent benzene, pyridine or pyrimidine rings;

the bridge C is a carbon atom, a nitrogen, an oxygen or a sulphur atom;

R<sub>1</sub> and R<sub>2</sub> independently are H, OH, a C<sub>1-6</sub> linear or branched alkoxy chain or a C<sub>1-20</sub> linear or branched alkyl chain, or a C<sub>1-6</sub> linear or branched alkoxy or C<sub>1-20</sub> linear or branched alkyl chain having one or more of 1-2 double bonds, 1 triple bond, 1-4 oxygen functions, 1-3 nitrogen-, 1-3 halogen- or 1-2 sulphur-containing substituents, 1-2 phosphate groups, 1-2 non-substituted or substituted phenyl or cyclohexyl groups, or 1-2 five- or six-membered heterocyclic rings; or R<sub>1</sub> and R<sub>7</sub> together are said alkyl or alkoxy chain bonded directly to a carbon atom in the ring A or via a carbon, oxygen, nitrogen or sulphur atom; or R<sub>1</sub> and R<sub>2</sub> together form a double bond to the optionally substituted C<sub>1-20</sub> linear or branched alkyl chain, to an oxo group, to a sulphur atom or to a nitrogen atom substituted with H, OH, an alkyl or alkoxy group; and

R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> and R<sub>12</sub>, which can be the same or different, are selected from the group consisting of H, OH, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, OCH(CH<sub>3</sub>)<sub>2</sub>, OC(CH<sub>3</sub>)<sub>3</sub>, OCHCH<sub>2</sub>, OCHCHCH<sub>3</sub>, OCH<sub>2</sub>CHCH<sub>2</sub>, OCCH, OCOH, OCO(CH<sub>2</sub>)<sub>0-18</sub>CH<sub>3</sub>, OCH<sub>2</sub>OH, OCHO, OCOOH, OCOCH<sub>3</sub>, OCOC<sub>2</sub>H<sub>5</sub>, OCOC<sub>3</sub>H<sub>7</sub>, OCOOCH<sub>3</sub>, OCOOC<sub>2</sub>H<sub>5</sub>, OCOOC<sub>3</sub>H<sub>7</sub>, OCH<sub>2</sub>OOCH, OCH<sub>2</sub>OOCCH<sub>3</sub>, OCH<sub>2</sub>OOCCH<sub>2</sub>H<sub>5</sub>, OCH<sub>2</sub>CH<sub>2</sub>OH, OCH<sub>2</sub>CHO, OCH<sub>2</sub>COOH, OC<sub>2</sub>H<sub>4</sub>CH<sub>2</sub>OH, OC<sub>2</sub>H<sub>4</sub>CHO, OC<sub>2</sub>H<sub>4</sub>COOH, CH<sub>3</sub>, CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, CH(CH<sub>3</sub>)<sub>2</sub>, C(CH<sub>3</sub>)<sub>3</sub>, CHCH<sub>2</sub>, CHCHCH<sub>3</sub>, CH<sub>2</sub>CHCH<sub>2</sub>, CCH, CH<sub>2</sub>OH, CHO, COOH, COCH<sub>3</sub>, COC<sub>2</sub>H<sub>5</sub>, COC<sub>3</sub>H<sub>7</sub>, COOCH<sub>3</sub>, COOC<sub>2</sub>H<sub>5</sub>,

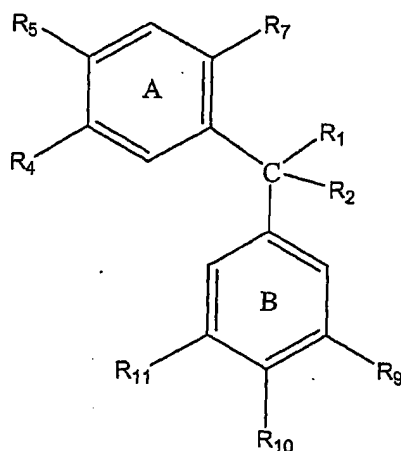
COOC<sub>3</sub>H<sub>7</sub>, CH<sub>2</sub>OOCH, CH<sub>2</sub>OOCCH<sub>3</sub>, CH<sub>2</sub>OCC<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>CH<sub>2</sub>OH, CH<sub>2</sub>CHO, CH<sub>2</sub>COOH, C<sub>2</sub>H<sub>4</sub>CH<sub>2</sub>OH, C<sub>2</sub>H<sub>4</sub>CHO, C<sub>2</sub>H<sub>4</sub>COOH, F, Cl, Br, I, CF<sub>3</sub>, CN, NH<sub>2</sub>, NO<sub>2</sub>, CH<sub>2</sub>CN, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NO<sub>2</sub>, CONH<sub>2</sub>, CONHCH<sub>3</sub>, NH(C<sub>1-3</sub> alkyl), N(C<sub>1-3</sub> alkyl)<sub>2</sub>, NHCOCH<sub>3</sub>, NHNHCOCH<sub>3</sub>, NHNHCONH<sub>2</sub>, SCH<sub>3</sub>, OPO<sub>3</sub> and OSi(CH<sub>3</sub>)<sub>2</sub>C(CH<sub>3</sub>)<sub>3</sub>; or

- 5 wherein two of R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> and R<sub>12</sub> on adjacent carbon atoms in the rings A and B together are CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>, O(CH<sub>2</sub>)<sub>1-3</sub>O, OCHCH<sub>3</sub>O, OC(CH<sub>3</sub>)<sub>2</sub>O, OCOO, OCOCH<sub>2</sub>, NHCH<sub>2</sub>CH<sub>2</sub>, or NHCOCH<sub>2</sub>;

with the provisos that when R<sub>4</sub> and R<sub>5</sub> together form a methylenedioxy group:

- 0 i) R<sub>3</sub> and R<sub>6</sub> must not both be H when R<sub>7</sub> is H or forms a bond with R<sub>1</sub> being a C<sub>1-5</sub> linear or branched alkyl chain optionally having a double bond; or
- ii) R<sub>8</sub>, R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> and R<sub>12</sub> must not be 1-3 OCH<sub>3</sub> and 2-4 H, or 1 OCH<sub>3</sub> and 2 OH and 2 H, or 1 OCH<sub>3</sub> and 1 OH and 3 H, or 2 OCH<sub>3</sub> and 1 OH and 2 H; or
- iii) and when R<sub>2</sub> is H, then R<sub>1</sub> must not be H, OH, OCH<sub>3</sub>, OC<sub>2</sub>H<sub>5</sub>, or a C<sub>1-5</sub> linear or branched alkyl chain optionally having a double bond or together with R<sub>7</sub> forming a bond to the carbon atom in the ring A, and with 0-3 oxygen functions; or
- 5 iv) and when R<sub>2</sub> is H, then the distance between the carbon atom of the methylenedioxy group and the carbon atom of a methoxy group in the ring B must not be 0.85 – 1.05 nm; as a specific inhibitor of tyrosine phosphorylation of the insulin-like growth factor-1 receptor.

- 20 2. Use according to claim 1 of a compound having the formula Ib



Formula Ib

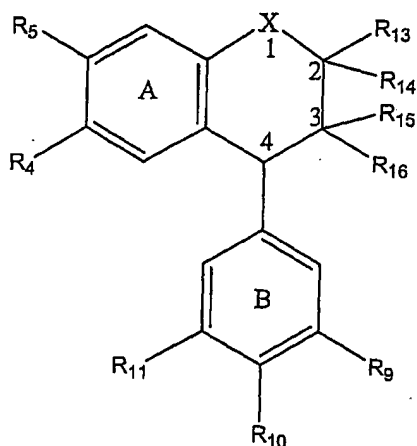
wherein A and B represent benzene rings and C is a carbon atom;

- $R_1$  and  $R_2$ , which can be the same or different, are selected from the group consisting of H, OH,  $\text{CH}_3$ ,  $\text{CH}_2\text{CH}_3$ ,  $\text{CH}_2\text{CH}_2\text{CH}_3$ ,  $\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ ,  $\text{CH}_2\text{CHCH}_2$ ,  $\text{CH}_2\text{CH}(\text{CH}_3)_2$ ,  $\text{OCH}_3$ ,  $\text{OCH}_2\text{CH}_3$ ,  $\text{OCH}_2\text{CH}_2\text{CH}_3$ ,  $\text{OCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ ,  $\text{OCH}_2\text{CHCH}_2$ ,  $\text{OCH}_2\text{CH}(\text{CH}_3)_2$ ,  $\text{CH}_2\text{OH}$ ,  $\text{CH}_2\text{CH}_2\text{OH}$ ,  $\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ ,  $\text{OCH}_2\text{OH}$ ,  $\text{OCH}_2\text{CH}_2\text{OH}$ ,  $\text{OCH}_2\text{CH}_2\text{CH}_2\text{OH}$ , a phenyl, piperidinyl and morpholino group; or  $R_1$  and  $R_2$  together are O,  $\text{CH}_2$ ,  $\text{CHCH}_3$ ,  $\text{CHCH}_2\text{CH}_3$ ,  $\text{C}(\text{CH}_3)_2$ ,  $\text{CHCH}(\text{CH}_3)_2$ ,  $\text{C}(\text{CH}_2\text{CH}_3)\text{phenyl}$ ,  $\text{NOH}$ ,  $\text{NOCH}_3$ ,  $\text{NOCH}_2\text{CH}_3$  or  $\text{NOCH}_2\text{CH}_2\text{CH}_3$ ; and
- $R_4$ ,  $R_5$ ,  $R_7$ ,  $R_9$ ,  $R_{10}$  and  $R_{11}$ , which may be the same or different, are selected from the group consisting of H, OH,  $\text{CH}_3$ ,  $\text{CH}_2\text{CH}_3$ ,  $\text{CH}_2\text{CH}_2\text{CH}_3$ ,  $\text{CH}_2\text{CHCH}_2$ ,  $\text{OCH}_3$ ,  $\text{OCH}_2\text{CH}_3$ ,  $\text{OCH}_2\text{CH}_2\text{CH}_3$ ,  $\text{OCH}_2\text{CHCH}_2$ ,  $\text{CH}_2\text{OH}$ ,  $\text{CH}_2\text{CH}_2\text{OH}$ ,  $\text{OCH}_2\text{OH}$ ,  $\text{OCH}_2\text{CH}_2\text{OH}$ ,  $\text{COOCH}_3$ , F, Cl,  $\text{CF}_3$ ,  $\text{NH}_2$ ,  $\text{NHCH}_3$ ,  $\text{OCO}(\text{CH}_2)_{0-18}\text{CH}_3$  and  $\text{OPO}_3$ ; or wherein  $R_4$  and  $R_5$  and/or  $R_9$  and  $R_{10}$  together are a methylenedioxy group;

with the provisos that when  $R_4$  and  $R_5$  together form a methylenedioxy group:

- i)  $R_7$  must not be H; or
- ii)  $R_9$ ,  $R_{10}$ , and  $R_{11}$  must not be 1-3  $\text{OCH}_3$  and 0-2 H, or 1  $\text{OCH}_3$  and 2 OH, or 1  $\text{OCH}_3$  and 1 OH and 1 H, or 2  $\text{OCH}_3$  and 1 OH; or
- iii) and when  $R_2$  is H, then  $R_1$  must not be H, OH,  $\text{OCH}_3$ ,  $\text{OC}_2\text{H}_5$ , or a  $\text{C}_{1-5}$  linear or branched alkyl chain optionally having a double bond and/or 1-3 oxygen functions; or
- iv) and when  $R_2$  is H, then the distance between the carbon atom of the methylenedioxy group and the carbon atom of a methoxy group in the ring B must not be 0.85 – 1.05 nm.

3. Use according to claim 1 of a compound of the formula II



Formula II

wherein A and B represent benzene rings;

X is O, NH, NCH<sub>3</sub>, NCH<sub>2</sub>CH<sub>3</sub>, NOH, NOCH<sub>3</sub>, S or SO<sub>2</sub>;

R<sub>4</sub>, R<sub>5</sub>, R<sub>9</sub>, R<sub>10</sub> and R<sub>11</sub>, which may be the same or different, are selected from the group consisting of H, OH, CH<sub>3</sub>, CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CHCH<sub>2</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>,

OCH<sub>2</sub>CHCH<sub>2</sub>, CH<sub>2</sub>OH, CH<sub>2</sub>CH<sub>2</sub>OH, OCH<sub>2</sub>OH, OCH<sub>2</sub>CH<sub>2</sub>OH, COOCH<sub>3</sub>, F, Cl, CF<sub>3</sub>, NH<sub>2</sub>, NHCH<sub>3</sub>,

- 5 OCO(CH<sub>2</sub>)<sub>0-18</sub>CH<sub>3</sub> and OPO<sub>3</sub>; or R<sub>4</sub> and R<sub>5</sub> and/or R<sub>9</sub> and R<sub>10</sub> together are a methylenedioxy group; and

R<sub>13</sub>, R<sub>14</sub>, R<sub>15</sub> and R<sub>16</sub>, which can be the same or different, are selected from the group consisting of H, OH, CH<sub>3</sub>, CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CHCH<sub>2</sub>, CH<sub>2</sub>CH(CH<sub>3</sub>)<sub>2</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CHCH<sub>2</sub>, OCH<sub>2</sub>CH(CH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>OH,

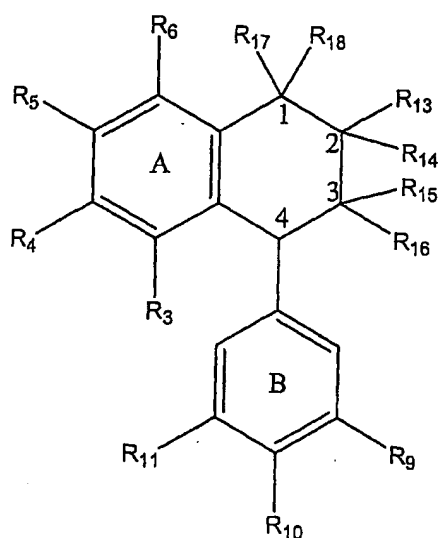
- 3 CH<sub>2</sub>CH<sub>2</sub>OH, CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH, OCH<sub>2</sub>OH, OCH<sub>2</sub>CH<sub>2</sub>OH, OCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH, a phenyl, piperidinyl and morpholino group; or R<sub>14</sub> and R<sub>15</sub>

together form a double bond between the carbon atoms 2 and 3.

4. Use of a compound of the formula II according to claim 3, wherein R<sub>13</sub> and R<sub>14</sub> together or R<sub>15</sub>

- 5 and R<sub>16</sub> together are O, or R<sub>14</sub> and R<sub>15</sub> together are selected from the group consisting of CH<sub>2</sub>OCO, COOCH<sub>2</sub>, CH<sub>2</sub>OCH<sub>2</sub>, CH<sub>2</sub>CH<sub>2</sub>CO, CH<sub>2</sub>OC(CH<sub>3</sub>)<sub>2</sub>OCH<sub>2</sub>, OC(CH<sub>3</sub>)<sub>2</sub>O, CH<sub>2</sub>OCOOCH<sub>2</sub>, OCOO, CH<sub>2</sub>OCH<sub>2</sub>OCH<sub>2</sub> and OCH<sub>2</sub>O.

5. Use according to claim 1 of a compound of the formula III



Formula III

wherein A and B represent benzene rings;

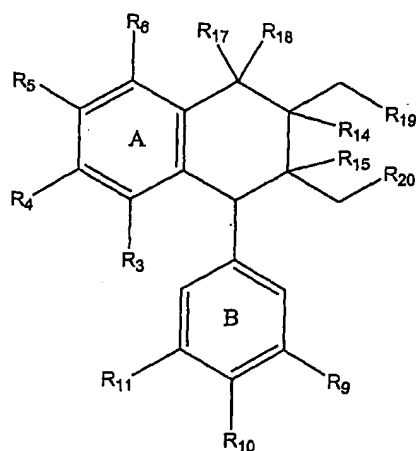
$R_3, R_4, R_5, R_6, R_9, R_{10}$  and  $R_{11}$ , which may be the same or different, are selected from the group consisting of H, OH,  $CH_3$ ,  $CH_2CH_3$ ,  $CH_2CH_2CH_3$ ,  $CH_2CHCH_2$ ,  $OCH_3$ ,  $OCH_2CH_3$ ,  $OCH_2CH_2CH_3$ ,  $OCH_2CHCH_2$ ,  $CH_2OH$ ,  $CH_2CH_2OH$ ,  $OCH_2OH$ ,  $OCH_2CH_2OH$ ,  $COOCH_3$ , F, Cl,  $CF_3$ ,  $NH_2$ ,  $NHCH_3$ ,  $OCO(CH_2)_{0-18}CH_3$  and  $OPO_3$ ; or  $R_4$  and  $R_5$  and/or  $R_9$  and  $R_{10}$  together are a methylenedioxy group;

- 5  $R_{13}, R_{14}, R_{15}, R_{16}, R_{17}$  and  $R_{18}$ , which can be the same or different, are selected from the group consisting of H, OH,  $OCH_3$ ,  $OCH_2CH_3$ ,  $OCH_2CH_2CH_3$ ,  $OCH_2CH_2CH_2CH_3$ ,  $OCH_2CHCH_2$ ,  $OCH_2CH(CH_3)_2$ ,  $CH_2OH$ ,  $CH_2CH_2OH$ ,  $CH_2CH_2CH_2OH$ ,  $OCH_2OH$ ,  $OCH_2CH_2OH$ ,  $OCH_2CH_2CH_2OH$ , a phenyl, piperidiny and morpholino group; or  $R_{15}, R_{16}, R_{17}$  and  $R_{18}$  are  $CH_3$ ,  $CH_2CH_3$ ,  $CH_2CH_2CH_3$ ,  $CH_2CH_2CH_2CH_3$ ,  $CH_2CHCH_2$ , or  $CH_2CH(CH_3)_2$ ; or  $R_{13}$  and  $R_{14}$  together or
- 0  $R_{14}$  and  $R_{15}$  together or  $R_{17}$  and  $R_{18}$  together are O; or  $R_{14}$  and  $R_{15}$  together are  $OC(CH_3)_2O$ ,  $OCOO$  or  $OCH_2O$ ; or  $R_{14}$  and  $R_{15}$  form a double bond between the carbon atoms 2 and 3;

with the provisos that when  $R_4$  and  $R_5$  together form a methylenedioxy group:

- i)  $R_3$  and  $R_6$  must not both be H; or
- ii)  $R_9, R_{10}$  and  $R_{11}$  must not be 1-3  $OCH_3$  and 0-2 H, or 1  $OCH_3$  and 2 OH, or 1  $OCH_3$  and 1 OH and 1 H, or 2  $OCH_3$  and 1 OH; or
- 15 iii)  $R_{13}$  and  $R_{14}$  together,  $R_{15}$  and  $R_{16}$  together, or  $R_{17}$  and  $R_{18}$  together must not be O; or
- iv) and when  $R_{13}, R_{15}$  and  $R_{17}$  are H,  $R_{14}, R_{16}$  and  $R_{18}$  must not be only H, OH or  $OCH_3$  or  $R_{14}$  and  $R_{16}$  together or  $R_{14}$  and  $R_{18}$  together must not form a methylenedioxy group, acetonide group or a carbonate group; or
- 20 v) the distance between the carbon atom of the methylenedioxy group and the carbon atom of a methoxy group in the ring B must not be 0.85 – 1.05 nm.

6. Use according to claim 1 of a compound of the formula IV



Formula IV

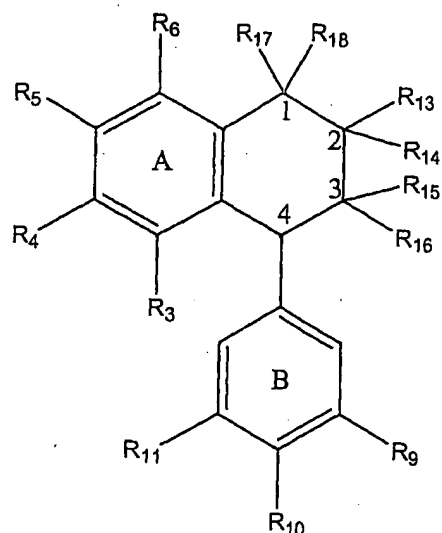
wherein A and B represent benzene rings;

R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>9</sub>, R<sub>10</sub> and R<sub>11</sub>, which may be the same or different, are selected from the group consisting of H, OH, CH<sub>3</sub>, CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CHCH<sub>2</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>,  
 5 OCH<sub>2</sub>CHCH<sub>2</sub>, CH<sub>2</sub>OH, CH<sub>2</sub>CH<sub>2</sub>OH, OCH<sub>2</sub>OH, OCH<sub>2</sub>CH<sub>2</sub>OH, COOCH<sub>3</sub>, F, Cl, CF<sub>3</sub>, NH<sub>2</sub>, NHCH<sub>3</sub>,  
 OCO(CH<sub>2</sub>)<sub>0-18</sub>CH<sub>3</sub> and OPO<sub>3</sub>; or R<sub>4</sub> and R<sub>5</sub> and/or R<sub>9</sub> and R<sub>10</sub> together are a methylenedioxy group;  
 R<sub>14</sub> and R<sub>15</sub>, which can be the same or different, are H, OH, CH<sub>3</sub> or OCH<sub>3</sub>;  
 R<sub>17</sub> and R<sub>18</sub>, which can be the same or different, are H, OH, CH<sub>3</sub>, CH<sub>2</sub>CH<sub>3</sub>, OCOH, OCO(CH<sub>2</sub>)<sub>0-18</sub>CH<sub>3</sub>, OCH<sub>3</sub>, OC<sub>2</sub>H<sub>5</sub> or OPO<sub>3</sub>; or R<sub>17</sub> and R<sub>18</sub> together are O, CH<sub>2</sub>, CHCH<sub>3</sub>, NOH, NOCH<sub>3</sub>,  
 10 NOCH<sub>2</sub>CH<sub>3</sub>;  
 R<sub>19</sub> and R<sub>20</sub>, which can be the same or different, are H, OH, OCH<sub>3</sub>, OC<sub>2</sub>H<sub>5</sub>, OOCH<sub>3</sub>, OOCH<sub>2</sub>CH<sub>3</sub>,  
 OCOH, or OCO(CH<sub>2</sub>)<sub>0-18</sub>CH<sub>3</sub>; or R<sub>19</sub> and R<sub>20</sub> together are O, CH<sub>2</sub>, CHCH<sub>3</sub>, NOH, NOCH<sub>3</sub>,  
 NOCH<sub>2</sub>CH<sub>3</sub> or a methylene bridge, an ether or a lactone group;  
 with the provisos that when R<sub>4</sub> and R<sub>5</sub> together form a methylenedioxy group:

- 15 i) R<sub>3</sub> and R<sub>6</sub> must not both be H; or
- ii) R<sub>9</sub>, R<sub>10</sub> and R<sub>11</sub> must not be 1-3 OCH<sub>3</sub> and 0-2 H, or 1 OCH<sub>3</sub> and 2 OH, or 1 OCH<sub>3</sub> and 1 OH and 1 H, or 2 OCH<sub>3</sub> and 1 OH; or
- iii) and when R<sub>14</sub>, R<sub>15</sub> and R<sub>17</sub> are H, then R<sub>18</sub>, R<sub>19</sub> and R<sub>20</sub> must not only be H, OH, OCH<sub>3</sub> or OC<sub>2</sub>H<sub>5</sub>, or R<sub>19</sub> and R<sub>20</sub> must not be OOCH<sub>3</sub> or OOCH<sub>2</sub>CH<sub>3</sub> or R<sub>19</sub> and R<sub>20</sub> together must  
 20 not be an ether or a lactone group; or
- iv) and when R<sub>14</sub> and R<sub>15</sub> are H, then R<sub>17</sub> and R<sub>18</sub> together must not be O in combination with R<sub>19</sub> and R<sub>20</sub> being H, OH, OCH<sub>3</sub> or OC<sub>2</sub>H<sub>5</sub>, or R<sub>19</sub> and R<sub>20</sub> being OOCH<sub>3</sub> or OOCH<sub>2</sub>CH<sub>3</sub> or R<sub>19</sub> and R<sub>20</sub> together being an ether or a lactone group; or
- v) the distance between the carbon atom of the methylenedioxy group and the carbon atom  
 25 of a methoxy group in the ring B must not be 0.85 – 1.05 nm.

7. Use according to claim 6 of a compound selected from the group consisting of 4,5-demethylene-deoxypodophyllotoxin, 4,5-dimethoxy-deoxypodophyllotoxin, 4,5-dimethoxy-deoxypicropodophyllin, beta-picropeltatin, beta-picropeltatin disodium phosphate, beta-picropeltatin  
 30 valerate, picropodophyllin disodium phosphate, picropodophyllin valerate, austrobailignan 1, austrobailignan 2, austrobailignan 3, polygamatin and picropolygamatin.

## 8. A compound of the formula III



Formula III

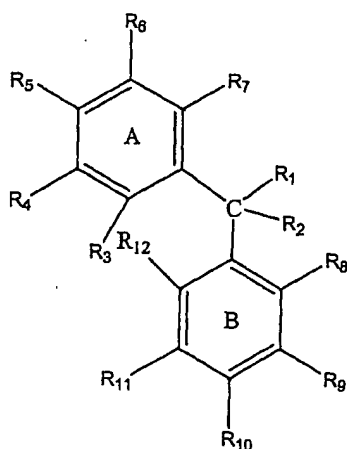
wherein A and B represent benzene rings;

- 5  $R_3, R_4, R_5, R_6, R_9, R_{10}$  and  $R_{11}$ , which can be the same or different, are selected from the group consisting of H, OH, CH<sub>3</sub>, CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CHCH<sub>2</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CHCH<sub>2</sub>, CH<sub>2</sub>OH, CH<sub>2</sub>CH<sub>2</sub>OH, OCH<sub>2</sub>OH, OCH<sub>2</sub>CH<sub>2</sub>OH, COOCH<sub>3</sub>, F, Cl, CF<sub>3</sub>, NH<sub>2</sub>, NHCH<sub>3</sub>, OCO(CH<sub>2</sub>)<sub>0-18</sub>CH<sub>3</sub> and OPO<sub>3</sub>; or  $R_4$  and  $R_5$  and/or  $R_9$  and  $R_{10}$  together are a methylenedioxy group;
- 10  $R_{13}, R_{14}, R_{15}, R_{16}, R_{17}$  and  $R_{18}$ , which can be the same or different, are selected from the group consisting of H, OH, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, OCH<sub>2</sub>CHCH<sub>2</sub>, OCH<sub>2</sub>CH(CH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>OH, CH<sub>2</sub>CH<sub>2</sub>OH, CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH, OCH<sub>2</sub>OH, OCH<sub>2</sub>CH<sub>2</sub>OH, OCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH, a phenyl, piperidiny and morpholino group; or  $R_{15}, R_{16}, R_{17}$  and  $R_{18}$  are CH<sub>3</sub>, CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CHCH<sub>2</sub>, or CH<sub>2</sub>CH(CH<sub>3</sub>)<sub>2</sub>; or  $R_{13}$  and  $R_{14}$  together or  $R_{14}$  and  $R_{15}$  together or  $R_{17}$  and  $R_{18}$  together are O; or  $R_{14}$  and  $R_{15}$  together are OC(CH<sub>3</sub>)<sub>2</sub>O, OCOO or OCH<sub>2</sub>O; or  $R_{14}$  and  $R_{15}$  form a double bond between the carbon atoms 2 and 3;
- 15 with the provisos that when  $R_4$  and  $R_5$  together form a methylenedioxy group:
- i)  $R_3$  and  $R_6$  must not both be H; or
  - ii)  $R_9, R_{10}$  and  $R_{10}$  must not be 1-3 OCH<sub>3</sub> and 0-2 H, or 1 OCH<sub>3</sub> and 2 OH, or 1 OCH<sub>3</sub> and 1 OH and 1 H, or 2 OCH<sub>3</sub> and 1 OH; or
  - 20 iii)  $R_{13}$  and  $R_{14}$  together,  $R_{15}$  and  $R_{16}$  together, or  $R_{17}$  and  $R_{18}$  together must not be O; or

- iv) and when  $R_{13}$ ,  $R_{15}$  and  $R_{17}$  are H,  $R_{14}$ ,  $R_{16}$  and  $R_{18}$  must not be only H, OH or  $OCH_3$  or  $R_{14}$  and  $R_{16}$  together or  $R_{14}$  and  $R_{18}$  together must not form a methylenedioxy group, acetonide group or a carbonate group; or
- v) the distance between the carbon atom of the methylenedioxy group and the carbon atom of a methoxy group in the ring B must not be 0.85 – 1.05 nm.

9. A compound according to claim 8 for use as a medicament.

10. A pharmaceutical composition comprising a compound of the formula I



Formula I

wherein A and B are rings linked together by a bridge C and independently represent benzene, pyridine or pyrimidine rings;

the bridge C is a carbon atom, a nitrogen, an oxygen or a sulphur atom;

$R_1$  and  $R_2$  independently are H, OH, a  $C_{1-6}$  linear or branched alkoxy chain or a  $C_{1-20}$  linear or branched alkyl chain, or a  $C_{1-6}$  linear or branched alkoxy or  $C_{1-20}$  linear or branched alkyl chain having one or more of 1-2 double bonds, 1 triple bond, 1-4 oxygen functions, 1-3 nitrogen-, 1-3 halogen- or 1-2 sulphur-containing substituents, 1-2 phosphate groups, 1-2 non-substituted or substituted phenyl or cyclohexyl groups, or 1-2 five- or six-membered heterocyclic rings; or  $R_1$  and  $R_7$  together are said alkyl or alkoxy chain bonded directly to a carbon atom in the ring A or via a carbon, oxygen, nitrogen or sulphur atom; or  $R_1$  and  $R_2$  together form a double bond to the optionally substituted  $C_{1-20}$  linear or branched alkyl chain, to an oxo group, to a sulphur atom or to a nitrogen atom substituted with H, OH, an alkyl or alkoxy group; and

$R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ ,  $R_9$ ,  $R_{10}$ ,  $R_{11}$  and  $R_{12}$ , which can be the same or different, are selected from the group consisting of H, OH,  $OCH_3$ ,  $OCH_2CH_3$ ,  $OCH_2CH_2CH_3$ ,  $OCH(CH_3)_2$ ,  $OC(CH_3)_3$ ,  $OCHCH_2$ ,



- OCHCHCH<sub>3</sub>, OCH<sub>2</sub>CHCH<sub>2</sub>, OCCH, OCOH, OCO(CH<sub>2</sub>)<sub>0-18</sub>CH<sub>3</sub>, OCH<sub>2</sub>OH, OCHO, OCOOH, OCOCH<sub>3</sub>, OCOC<sub>2</sub>H<sub>5</sub>, OCOC<sub>3</sub>H<sub>7</sub>, OCOOCH<sub>3</sub>, OCOOC<sub>2</sub>H<sub>5</sub>, OCOOC<sub>3</sub>H<sub>7</sub>, OCH<sub>2</sub>OOCH, OCH<sub>2</sub>OOCCH<sub>3</sub>, OCH<sub>2</sub>OOCCH<sub>2</sub>H<sub>5</sub>, OCH<sub>2</sub>CH<sub>2</sub>OH, OCH<sub>2</sub>CHO, OCH<sub>2</sub>COOH, OC<sub>2</sub>H<sub>4</sub>CH<sub>2</sub>OH, OC<sub>2</sub>H<sub>4</sub>CHO, OC<sub>2</sub>H<sub>4</sub>COOH, CH<sub>3</sub>, CH<sub>2</sub>CH<sub>3</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, CH(CH<sub>3</sub>)<sub>2</sub>, C(CH<sub>3</sub>)<sub>3</sub>, CHCH<sub>2</sub>, CHCHCH<sub>3</sub>, CH<sub>2</sub>CHCH<sub>2</sub>, CCH, CH<sub>2</sub>OH, CHO, COOH, COCH<sub>3</sub>, COC<sub>2</sub>H<sub>5</sub>, COC<sub>3</sub>H<sub>7</sub>, COOCH<sub>3</sub>, COOC<sub>2</sub>H<sub>5</sub>, COOC<sub>3</sub>H<sub>7</sub>, CH<sub>2</sub>OOCH, CH<sub>2</sub>OOCCH<sub>3</sub>, CH<sub>2</sub>OOCCH<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>CH<sub>2</sub>OH, CH<sub>2</sub>CHO, CH<sub>2</sub>COOH, C<sub>2</sub>H<sub>4</sub>CH<sub>2</sub>OH, C<sub>2</sub>H<sub>4</sub>CHO, C<sub>2</sub>H<sub>4</sub>COOH, F, Cl, Br, I, CF<sub>3</sub>, CN, NH<sub>2</sub>, NO<sub>2</sub>, CH<sub>2</sub>CN, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NO<sub>2</sub>, CONH<sub>2</sub>, CONHCH<sub>3</sub>, NH(C<sub>1-3</sub> alkyl), N(C<sub>1-3</sub> alkyl)<sub>2</sub>, NHCOCH<sub>3</sub>, NHNHCOCH<sub>3</sub>, NHNHCONH<sub>2</sub>, SCH<sub>3</sub>, OPO<sub>3</sub> and
- 10 OSi(CH<sub>3</sub>)<sub>2</sub>C(CH<sub>3</sub>)<sub>3</sub>; or

wherein two of R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> and R<sub>12</sub> on adjacent carbon atoms in the rings A and B together are CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>, CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>, O(CH<sub>2</sub>)<sub>1-3</sub>O, OCHCH<sub>3</sub>O, OC(CH<sub>3</sub>)<sub>2</sub>O, OCOO, OCOCH<sub>2</sub>, NHCH<sub>2</sub>CH<sub>2</sub>, or NHCOCH<sub>2</sub>.

with the provisos that when R<sub>4</sub> and R<sub>5</sub> together form a methylenedioxy group:

- 15 i) R<sub>3</sub> and R<sub>6</sub> must not both be H when R<sub>7</sub> is H or forms a bond with R<sub>1</sub> being a C<sub>1-5</sub> linear or branched alkyl chain optionally having a double bond; or
- ii) R<sub>8</sub>, R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> and R<sub>12</sub> must not be 1-3 OCH<sub>3</sub> and 2-4 H, or 1 OCH<sub>3</sub> and 2 OH and 2 H, or 1 OCH<sub>3</sub> and 1 OH and 3 H, or 2 OCH<sub>3</sub> and 1 OH and 2 H; or
- 20 iii) and when R<sub>2</sub> is H, then R<sub>1</sub> must not be H, OH, OCH<sub>3</sub>, OC<sub>2</sub>H<sub>5</sub>, or a C<sub>1-5</sub> linear or branched alkyl chain optionally having a double bond or together with R<sub>7</sub> forming a bond to the carbon atom in the ring A, and with 0-3 oxygen functions; or
- iv) and when R<sub>2</sub> is H, then the distance between the carbon atom of the methylenedioxy group and the carbon atom of a methoxy group in the ring B must not be 0.85 – 1.05 nm;
- in combination with a physiologically acceptable carrier.

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11. A pharmaceutical composition according to claim 10, comprising a compound having the formula I, Ib, II, III or IV as defined in any of claims 2-8.

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12. Use of a compound having the formula I, Ib, II, III or IV as defined in any of claims 1-8 for the preparation of a medicament specifically inhibiting tyrosine phosphorylation of the insulin-like growth factor-1 receptor.

13. Use of a compound having the formula I, Ib, II, III or IV as defined in any of claims 1-8 for the preparation of a medicament for prophylaxis or treatment of IGF-1R dependent diseases in vertebrates, such as benign and malignant neoplasms, the latter including carcinomas, sarcomas, neuroectodermal tumours, gliomas, myeloproliferative and lymphoproliferative diseases, and
- 5 arteriosclerosis, restenosis of the coronary arteries after vascular surgery, psoriasis, certain endocrine disorders, such as acromegaly, and metabolic disorders, such as syndrome X, and also for treatment of virus infected cells and self-reactive lymphocytes (T-cells), when these cells are dependent on IGF-1R for their survival.
- 10 14. Use according to claim 13 for prophylaxis or treatment in mammals, especially humans.
15. Use of a compound having the formula I, Ib, II, III or IV as defined in any of claims 1-8 in combination with other anti-cancer treatments, including cytostatica and other anti-cancer drugs, radiation, radiotherapy and surgery, for treatment of cancer in mammals.
- 15 16. Method of treatment of a cancer in a mammal, comprising the steps of administering a pharmaceutical composition according to claim 10 or 11 by constant infusion to a patient suffering from a tumour, monitoring the plasma level of the compound, and adjusting the rate of infusion to keep the plasma level relatively low and relatively constant for a period of time being sufficient for
- 20 the tumour to be retarded or to disappear.